

Claims

- [c1] 1. A method of forming a high thermally conductive article, comprising the steps of:
- providing a metallic base matrix of, by volume, between 30 and 60 percent;
 - providing a first thermally conductive filler, by volume, between 25 and 60 percent; the first thermally conductive filler having an aspect ratio of at least 10:1;
 - providing a second thermally conductive filler, by volume, between 10 and 25 percent; the second thermally conductive filler having an aspect ratio of less than 5:1;
 - and
 - mixing the first thermally conductive filler, the second thermally conductive filler and the metallic base matrix so that the first thermally conductive filler and the second thermally conductive filler are evenly dispersed throughout the metallic base matrix to form an entirely uniform molding composition;
 - injection molding the uniform composition into a unitary monolithic thermally conductive article; the first thermally conductive filler and the second thermally conductive filler and the base matrix therein cooperating to reduce the number of thermal interface gaps in said

monolithic thermally conductive article.

- [c2] 2. The method of Claim 1, wherein said base matrix is a Metal Injection Molding Material selected from the group consisting of aluminum, copper, brass, alumina and magnesium.
- [c3] 3. The method of Claim 1, wherein said first thermally conductive filler has particles that are substantially flake-shaped.
- [c4] 4. The method of Claim 1, wherein said first thermally conductive filler has particles that are substantially rice-shaped.
- [c5] 5. The method of Claim 1, wherein said first thermally conductive filler has particles that are substantially strand-shaped.
- [c6] 6. The method of Claim 1, wherein said first thermally conductive filler has particles that are substantially whisker-shaped.
- [c7] 7. The method of Claim 1, wherein said first thermally conductive filler is a material selected from the group consisting of aluminum, alumina, copper, magnesium, brass and carbon.
- [c8] 8. The method of Claim 1, wherein said second thermally

conductive filler material is boron nitride grains.

[c9] 9. The method of Claim 1, wherein said second thermally conductive filler has particles that are substantially grain shaped.

[c10] 10. The method of Claim 1, wherein said second thermally conductive filler is a material selected from the group consisting of aluminum, alumina, copper, magnesium, brass, boron nitride and carbon.

[c11] 11. A method of forming a high thermally conductive article, comprising the steps of:
providing a metallic base matrix of, by volume, between 30 and 60 percent;
providing a first thermally conductive filler, by volume, between 25 and 60 percent; the first thermally conductive filler having an aspect ratio of at least 10:1;
providing a second thermally conductive filler, by volume, between 10 and 25 percent; the second thermally conductive filler having an aspect ratio of less than 5:1;
and
mixing the first thermally conductive filler, the second thermally conductive filler and the metallic base matrix so that the first thermally conductive filler and the second thermally conductive filler are evenly dispersed throughout the metallic base matrix to form an entirely

uniform molding composition;
casting the uniform composition into a unitary monolithic thermally conductive article; the first thermally conductive filler and the second thermally conductive filler and the base matrix therein cooperating to reduce the number of thermal interface gaps in said monolithic thermally conductive article.

[c12] 12. The method of Claim 11, wherein said base matrix is a Metal Injection Molding Material selected from the group consisting of aluminum, copper, brass, alumina and magnesium.

[c13] 13. The method of Claim 11, wherein said first thermally conductive filler has particles that are substantially flake-shaped.

[c14] 14. The method of Claim 11, wherein said first thermally conductive filler has particles that are substantially rice-shaped.

[c15] 15. The method of Claim 11, wherein said first thermally conductive filler has particles that are substantially strand-shaped.

[c16] 16. The method of Claim 11, wherein said first thermally conductive filler has particles that are substantially whisker-shaped.

- [c17] 17. The method of Claim 11, wherein said first thermally conductive filler is a material selected from the group consisting of aluminum, alumina, copper, magnesium, brass and carbon.
- [c18] 18. The method of Claim 11, wherein said second thermally conductive filler material is boron nitride grains.
- [c19] 19. The method of Claim 11, wherein said second thermally conductive filler has particles that are substantially grain shaped.
- [c20] 20. The method of Claim 11, wherein said second thermally conductive filler is a material selected from the group consisting of aluminum, alumina, copper, magnesium, brass, boron nitride and carbon.